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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,263	06/23/2005	Kiyofumi Sakaguchi	00862.102566	1430
5514	7590	06/02/2006	EXAMINER	
FITZPATRICK CELLA HARPER & SCINTO 30 ROCKEFELLER PLAZA NEW YORK, NY 10112			PHAM, THANH V	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 06/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/540,263

Applicant(s)

SAKAGUCHI ET AL.

Examiner

Thanh V. Pham

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 1, 2, 19 and 20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>06/23/05</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election of Group II, claims 3-18, in the reply filed on 04/18/2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Specification

2. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

4. Claim 6 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The limitation of "the semiconductor substrate is a substrate having a strain induction layer" of claim 6 is already recited as "a semiconductor substrate which is made of a second material at least whose surface functions as a strain induction material" wherein 'a strain induction material' of ('at least') the 'surface of a semiconductor substrate' is considered as 'the

strain induction layer' in the first step of claim 3. (By the same reason, the limitation of "the strain induction layer is left on the second substrate" in claim 17 is acceptable).
[Therefore, the dependency of claims 7-9 and 11 is in need of change if claim 6 is canceled.]

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 3-8, 10-12 and 16 are rejected under 35 U.S.C. 102(a) as being anticipated by Chu et al. US 6,890,835 B1.

Re claim 3, the Chu et al. reference discloses a semiconductor substrate manufacturing method comprising:

a first step of forming a strained semiconductor layer 40 which is made of a first material on a semiconductor substrate 10/20/30 which is made of a second material at least whose surface 30 functions as a strain induction (relaxed) material to prepare a first substrate (fig. 1);

a second step of bonding the strained semiconductor layer 40 of the first substrate (of fig. 1) to a second substrate 80 which is made of the first material (fig. 2);
and

a third step of removing a member (*partial of element 10*) on a side of the first substrate 10/20/30 except the strained semiconductor layer 40 and leaving the strained semiconductor layer 40 on the second substrate 80 (fig. 3).

Re claims 4-5, the first material is silicon (col. 3, line 63), and the second material is $\text{Si}_{1-x}\text{Ge}_x$ ($0 < x \leq 1$) of element 20 and/or $\text{Si}_{1-y}\text{Ge}_y$ ($0 < y \leq 1$) of element 30 (col. 3, lines 50-58).

(Claim 6 is treated as a part/section of claim 3 as considered in the objection wherein the semiconductor substrate 10/20/30 is a substrate having a strain induction (relaxed) layer 20/30 formed on a surface 32.)

Re claim 7, the semiconductor substrate 10/20/30 is a substrate obtained by forming the strain induction (relaxed) layer 20/30 on a silicon substrate 10.

Re claim 8, a separation layer 70 is formed under the strain induction (relaxed) layer 20/30 (the step between fig. 1 and fig. 2, col. 4, line 26-32 "Hydrogen Induced layer Transfer Technique" incorporated by reference US 6,524,935).

Re claims 10 and 16, the removal of the member on the side of the first substrate in the third step comprises a step of separating a partial member on the side of the first substrate at the separation layer 70 (fig. 3); the member on the side of the first substrate except the strain induction layer 30, which remains on a side of the second substrate 80, is removed after the separation step at the separation layer (fig. 4).

Re claims 11-12, the strain induction layer 30 and/or 20 is essentially made of silicon and an additional material, $\text{Si}_{1-x}\text{Ge}_x$ ($0 < x \leq 1$) of element 20 and/or $\text{Si}_{1-y}\text{Ge}_y$ ($0 < y \leq 1$) of element 30.

7. Claims 3-7, 17 are rejected under 35 U.S.C. 102(a) as being anticipated by Canaperi et al. US 6,524,935 B1.

Re claim 3, the Canaperi et al. reference discloses a semiconductor substrate manufacturing method comprising:

a first step of forming a strained semiconductor layer 40 which is made of a first material on a semiconductor substrate 10/20/30 which is made of a second material at least whose surface 30 functions as a strain induction (relaxed) material to prepare a first substrate (fig. 1);

a second step of bonding the strained semiconductor layer 40 of the first substrate (of fig. 1) to a second substrate 80 which is made of the first material (fig. 3);
and

a third step of removing a member (10/20/72) on a side of the first substrate 10/20/30 except the strained semiconductor layer 40 and leaving the strained semiconductor layer 40 on the second substrate 80 (fig. 4).

Re claims 4-5, the first material is silicon (col. 3, line 32), and the second material is $\text{Si}_{1-x}\text{Ge}_x$ ($0 < x \leq 1$) of element 20 and/or $\text{Si}_{1-y}\text{Ge}_y$ ($0 < y \leq 1$) of element 30 (col. 3, lines 33-59).

(Claim 6 is treated as a part/section of claim 3 as considered in the objection wherein the semiconductor substrate 10/20/30 is a substrate having a strain induction (relaxed) layer 20/30 formed on a surface 12.)

Re claim 7, the semiconductor substrate 10/20/30 is a substrate obtained by forming the strain induction (relaxed) layer 20/30 on a silicon substrate 10.

Re claim 8, a separation layer 70 is formed under the strain induction (relaxed) layer 74 (figs. 2 and 4).

Re claims 9 and 15, the strain induction (relaxed) layer 30 of $\text{Si}_{1-y}\text{Ge}_y$ ($0 < y \leq 1$) also serves as a separation layer (figs. 2-4).

Re claims 10 and 16, the removal of the member on the side of the first substrate in the third step comprises a step of separating a partial member on the side of the first substrate at the separation layer 70 (fig. 4); the member on the side of the first substrate except the strain induction layer 30, which remains on a side of the second substrate 80, is removed after the separation step at the separation layer (fig. 5).

Re claims 11-12, the strain induction layer 30 and/or 20 is essentially made of silicon and an additional material, $\text{Si}_{1-x}\text{Ge}_x$ ($0 < x \leq 1$) of element 20 and/or $\text{Si}_{1-y}\text{Ge}_y$ ($0 < y \leq 1$) of element 30.

Re claim 17, after only the strain induction layer 74 is left on the second substrate 80, planarizing a surface 75 of the strain induction layer 74 (figs. 4-5 and corresponding passages).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chu et al. as applied to claims 3-8, 10-12 and 16-17 above, and further in view of Park et al. US Pub. 2003/0230778 A1.

Re claims 13-14, the Chu et al. reference discloses substantially all of the instant invention but does not disclose the separation layer is essentially made of a porous material.

The Park et al. reference discloses silicon substrate 140 in all three embodiments can be made porous by anodization, "after the bonded first and second substrates are annealed and the first substrate is separated along the porous silicon layer and removed, the porous silicon layer remaining on the silicon layer is removed" ([0019]) to have better epitaxially grown active layer and faster removing of the porous silicon layer after separation (incorporated by reference US 5,876,497).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of Chu et al. with porous anodized layer because the porous anodized layer of Park et al. would provide the Chu et al. method with better epitaxially grown active layer and faster removing of the porous silicon layer after separation.

10. Claims 9, 13-15 and 18 rejected under 35 U.S.C. 103(a) as being unpatentable over Canaperi et al. as applied to claims 3-7, 17 above, and further in view of Lee et al. US 6,881,650 B2.

Re claims 9, 13-15 and 18, the Canaperi et al. reference discloses substantially all of the instant invention but does not disclose the separation layer is the separation layer and essentially made of a porous material.

The Lee et al. reference discloses a porous silicon germanium 116 can be formed between the two epitaxially formed silicon germanium layers 114' and 118 to prevent lattice defects (abstract, [0037]-[0039]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the method of Canaperi et al. with the porous silicon germanium because the porous silicon germanium of Lee et al. would provide the method of Canaperi et al. with a layer of pores that "makes it possible to form the silicon-germanium layer and the strained silicon layer without defects" (Lee et al.'s [0021]).

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thanh V. Pham whose telephone number is 571-272-1866. The examiner can normally be reached on M-Th (6:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TWP

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